




EPA's Response to Fukushima Japan Nuclear Emergency



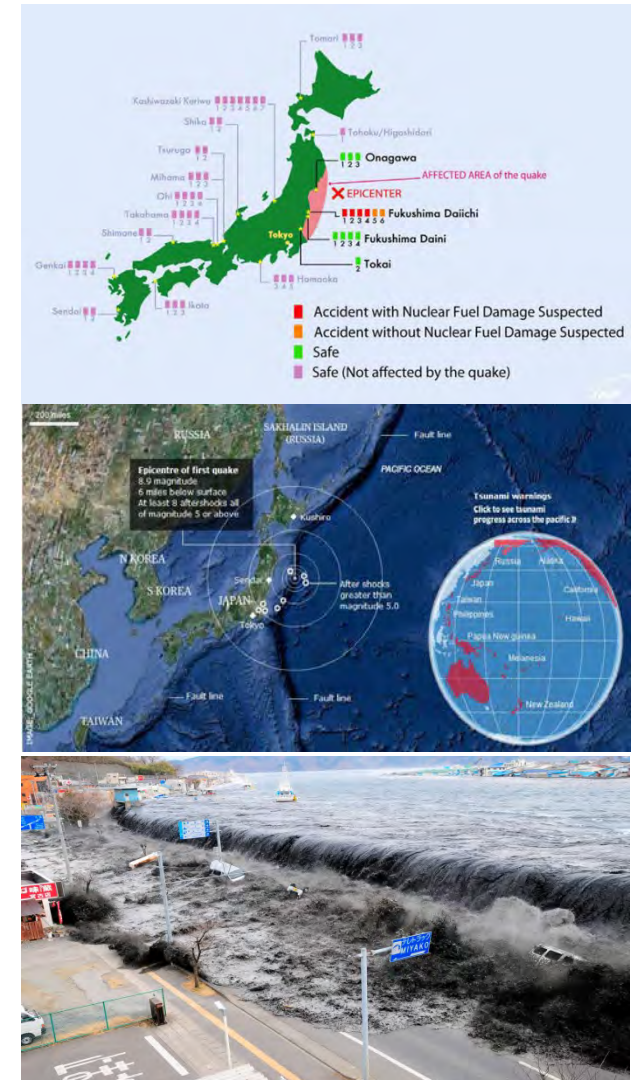
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EPA's Response to the Fukushima Daiichi NPP Emergency

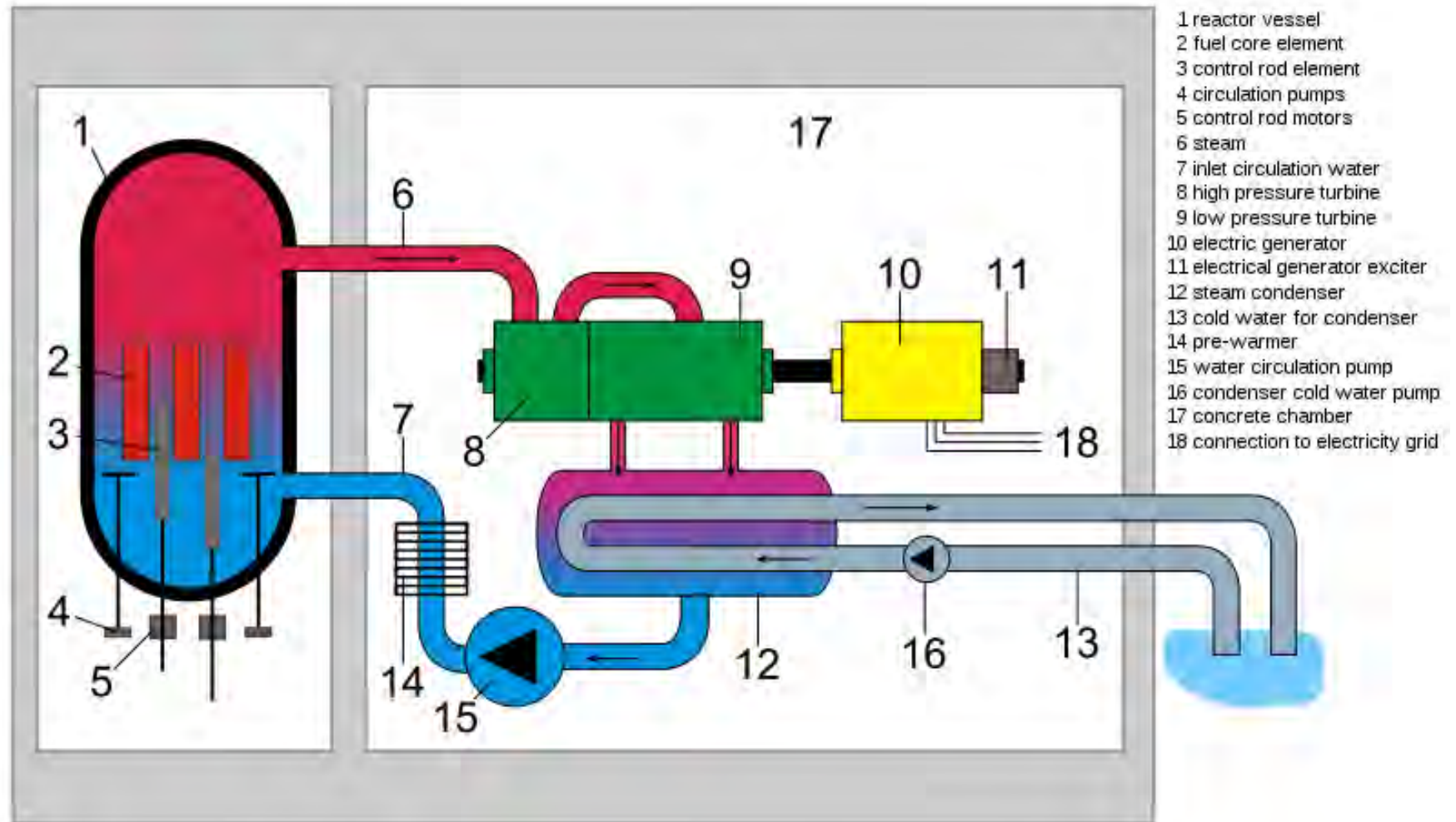
- ▶ Review the Incident – What Happened
 - ▶ Describe the EPA Response
 - ▶ Review EPA's RadNet Monitoring System
 - ▶ Present Illustrative Monitoring Results
 - ▶ Discuss results, potential impacts and risks from the Fukushima in US
- 

THE CASCADING EVENTS

- Japan is heavily invested in nuclear power, but tsunamis are a common occurrence (over 195 tsunamis recorded) after strong earthquakes within the ring of fire where over 90% of earthquakes occur.
- March 11th saw confluence of multiple events:
 - Earthquake rated 9.0 on the Richter scale
 - tsunami with waves of over 20m
 - failure of electrical power to a group of nuclear power plants (NPP)



THE CASCADING EVENTS



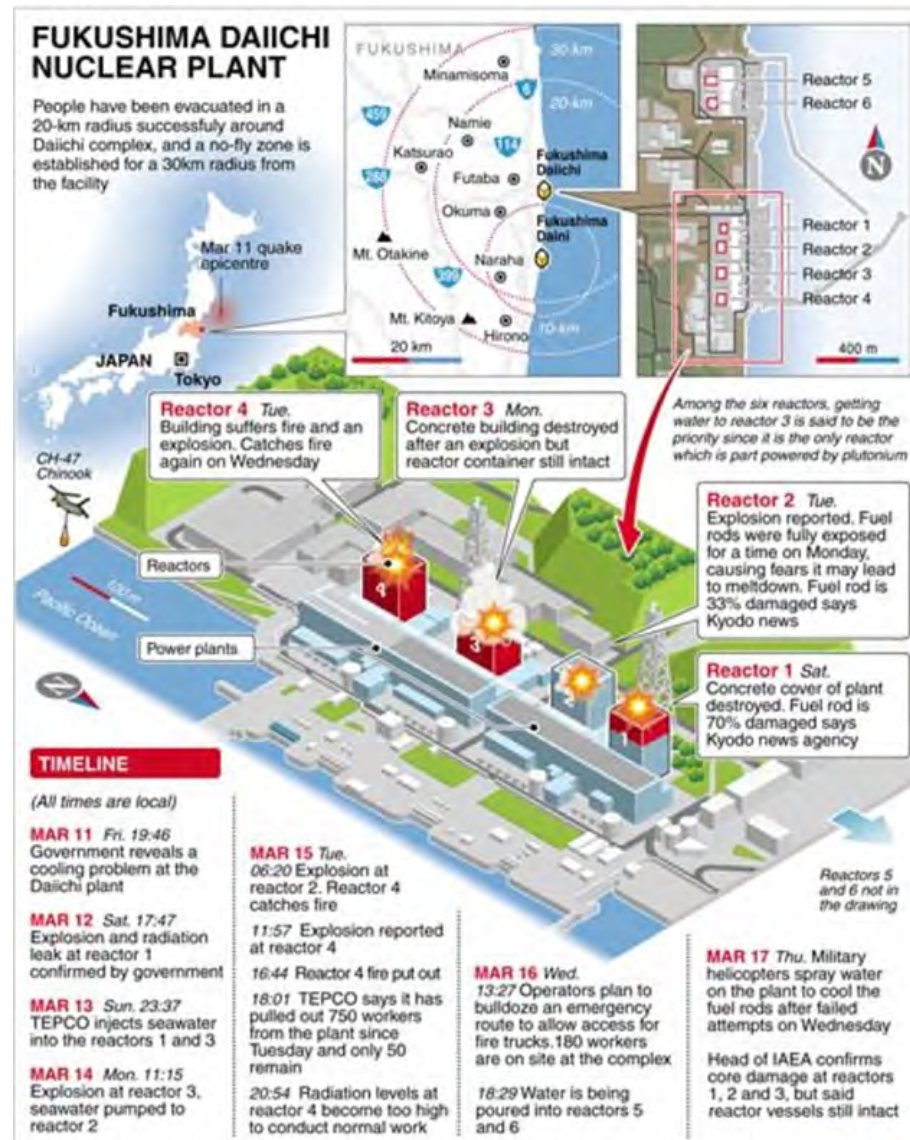
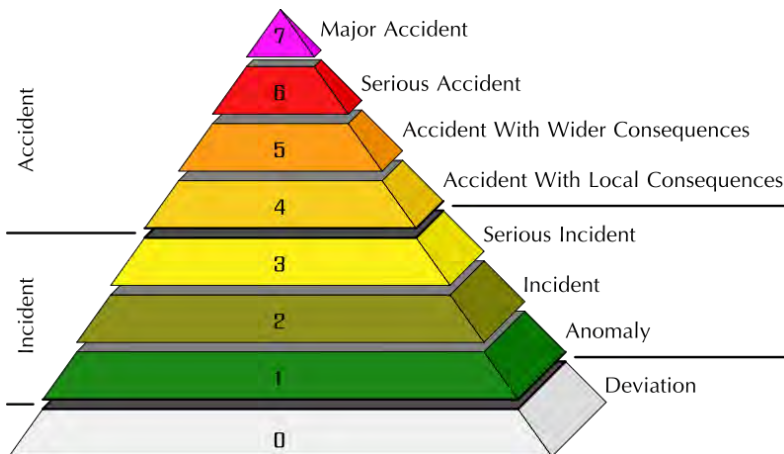


THE CASCADING EVENTS

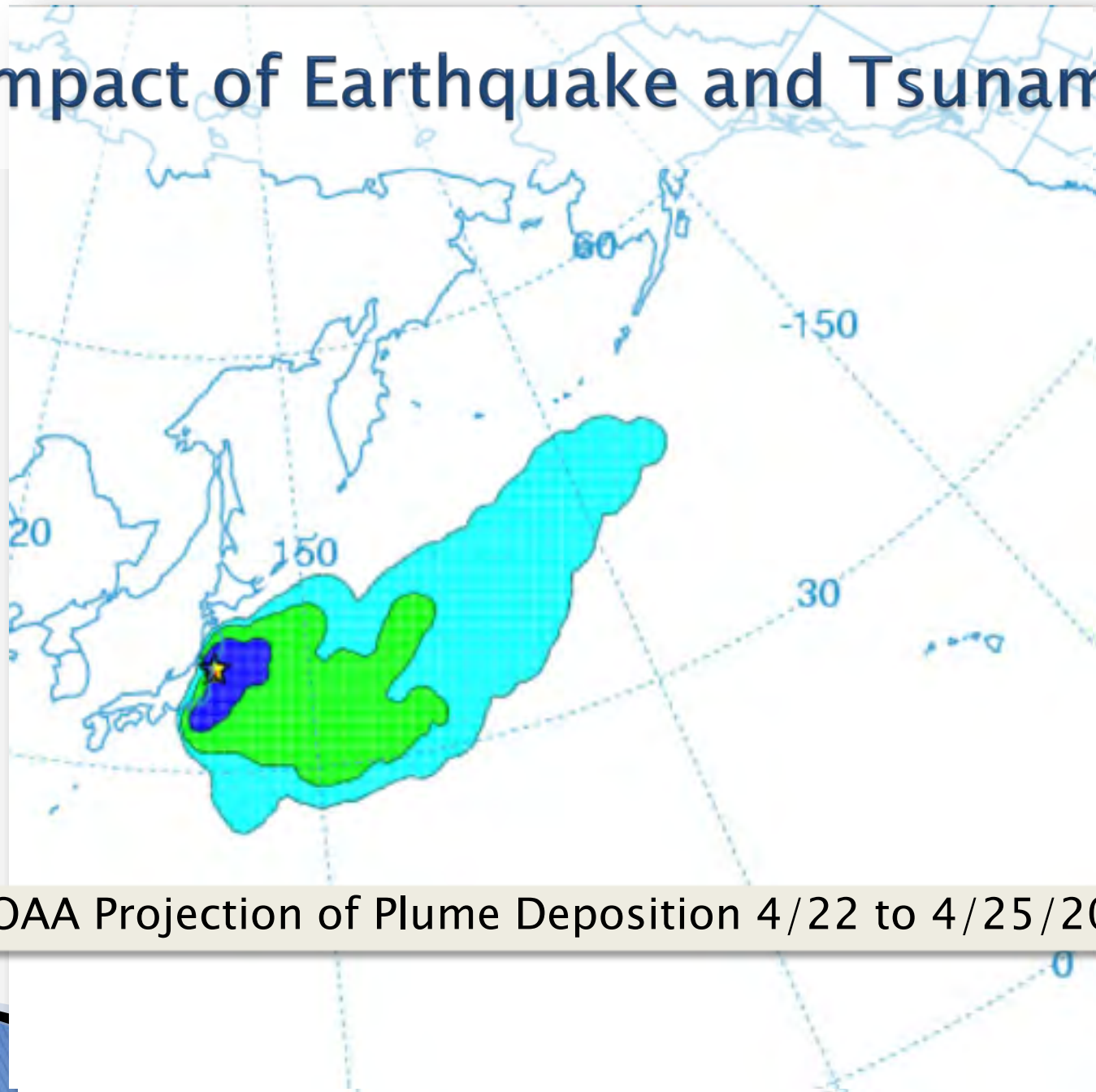
- **11 reactors, including reactors at Fukushima 1 and 2, went into SCRAM.** Control rods were inserted between the fuel assemblies, halting the power-producing nuclear reactions. A significant amount of the core's heat continued to be generated by these elements, and there is no way to turn them off.
- **Diesel generators designed to keep feeding water to Fukushima Unit 1 shutdown.** Later, the water supply to Unit 3 was interrupted. In both cases, the ability to moderate continued heat production was compromised.
- **Temperature at the core of reactors began to rise.** As it did, what water that remained began to boil off in both reactor cores and cooling ponds where spent rods had been deposited.
- **Hydrogen from the interaction of water and the metal rod cladding accumulated.** Multiple explosions attributed to hydrogen and associated relief work (eg, injection of nitrogen) creating additional hazards.

THE CASCADING EVENTS

- Meltdowns in multiple reactor cores
- Overheating in cooling ponds for spent fuel
- Radionuclides released/detected in air, soil, and water locally and at distance
- INES rating progressively increasing from 3–7 on April 11th (Chernobyl previously the only INES 7)



Impact of Earthquake and Tsunami

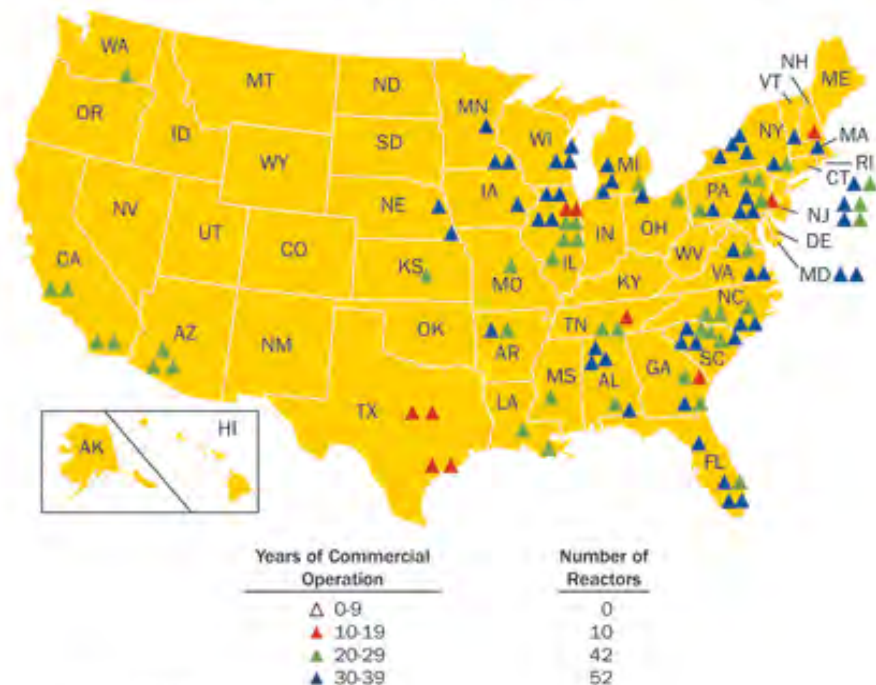


NOAA Projection of Plume Deposition 4/22 to 4/25/2011

REGULATORY FRAMEWORK

- ▶ In the US, the NRC has authority for the safeguards and security of civilian nuclear reactors since 1974.

- Regulation of 104 plants in 31 states
- Over 30 research and test reactors (RTRs);
- Medical, academic, and industrial uses;
- Decommissioning;
- Transport, storage, and disposal



Source: U.S. Nuclear Regulatory Commission

REGULATORY FRAMEWORK

- **Emergency preparedness:**
 - NRC has statutory responsibility for the radiological health and safety of the public by overseeing onsite preparedness and has overall authority for both onsite and offsite emergency preparedness
 - Federal oversight of emergency preparedness for licensed nuclear power plants is shared by the NRC and Federal Emergency Management Agency (FEMA).
 - FEMA takes the lead in initially reviewing and assessing the offsite planning and response and in assisting State and local governments



REGULATORY FRAMEWORK

- NRC defines two emergency planning zones (EPZs) around each nuclear power plant:
 - The plume exposure pathway EPZ extends 10 miles in radius around a plant. Its primary concern is the exposure of the public to, and the inhalation of, airborne radioactive contamination.
 - The ingestion pathway EPZ extends 50 miles in radius around a plant. Its primary concern is the ingestion of food and liquid that is contaminated by radioactivity.
 - Generally, initial evacuation occurs within 2 mile radius and 5 miles downwind – a “keyhole” pattern.

REGULATORY FRAMEWORK

- **Local plans for a nuclear power plant event:**
 - Requirements related to population monitoring
 - Established working relationships with planning partners in the state radiation control program and federal partners in the Federal Emergency Management Agency (FEMA), Department of Homeland Security (DHS), and the Nuclear Regulatory Commission (NRC).
 - Working with area hospitals, which already have plans for receiving and treating patients as a result of a radiation incident.



REGULATORY FRAMEWORK

- In 2002, U.S. Public Law 107–188, Section 127 was enacted requiring the U.S. government to provide State and local governments with KI tablets to protect the population within an expanded 20 miles (32 km) of a nuclear power plant.
- In 2008, this requirement was reduced to a 10 mile radius from a nuclear power plant (NAS/NRC, 2004).

MEDICAL MANAGEMENT

- **Potassium iodide:**

- A common treatment method for preventing iodine-131 exposure is by saturating the thyroid with regular, non-radioactive iodine-127, as an iodide salt. The thyroid will absorb very little of the radioactive iodine-131 after it is saturated with non-radioactive iodide, thereby avoiding the damage caused from radioiodine.
- The most common method of treatment is to give potassium iodide to those at risk. The dosage for adults is 130 mg potassium iodide per day, given in one dose, or divided into portions of 65 mg twice a day.

One/day “for no more than 10 days”



EPA Response

- ▶ Emergency Operations Center
- ▶ Radiological Emergency Response Team
- ▶ Regional Response
- ▶ RadNet
 - Fixed Network
 - Deployable Monitors
 - Precipitation Sampling
 - Milk Sampling
 - Drinking Water Sampling
 - Laboratory Analysis
- ▶ EPA Japan Incident Website:
<http://www.epa.gov/japan2011/>



RADNET

Tracking Environmental Radiation Nationwide

National Radiation Monitoring System



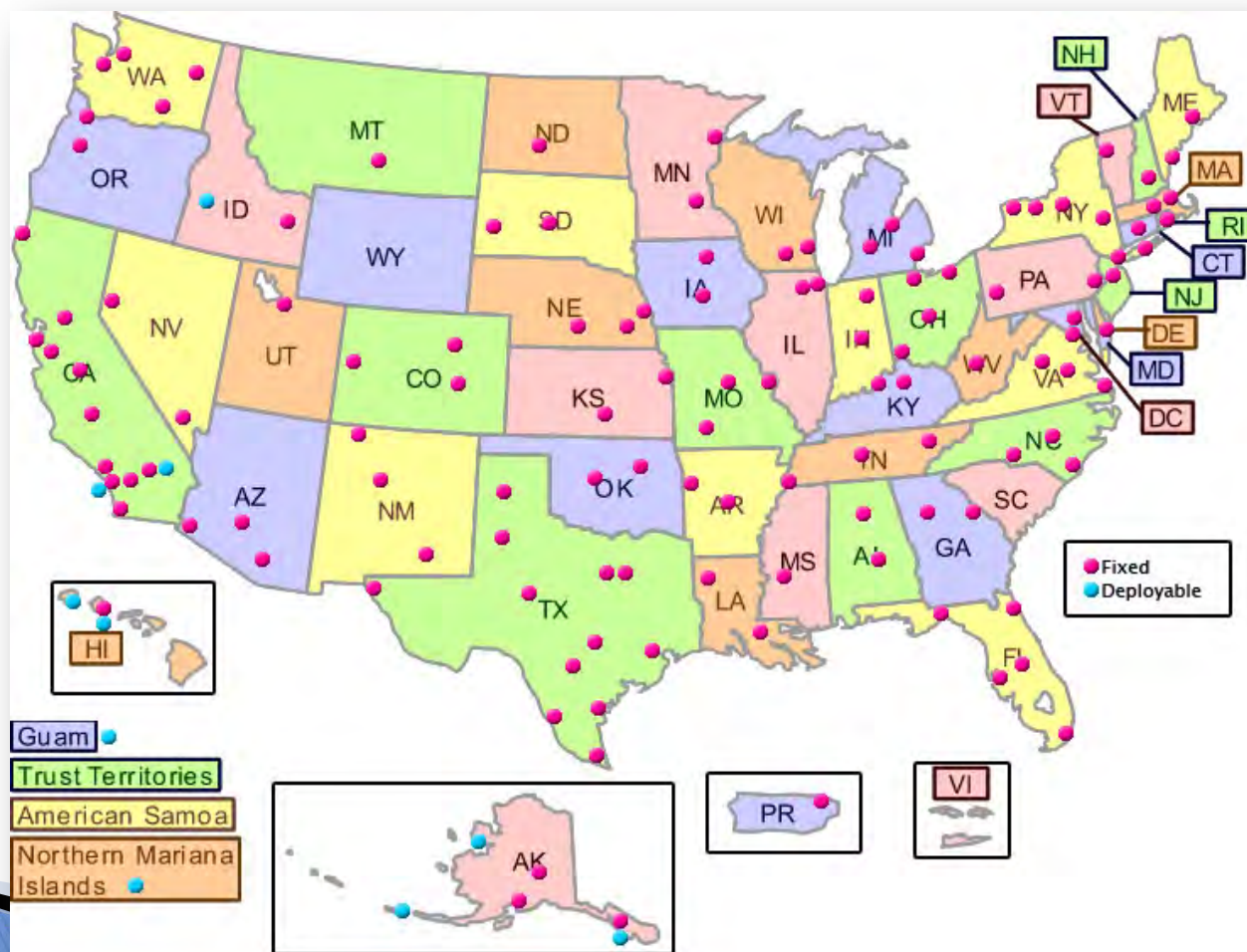
- ▶ EPA's RadNet monitors across the US show typical fluctuations in background radiation levels.
- ▶ Additional Deployable Monitors were sent to the Aleutian islands, Hawaii, Guam and Saipan to improve monitoring coverage for this event.
- ▶ The levels detected are far below levels of concern



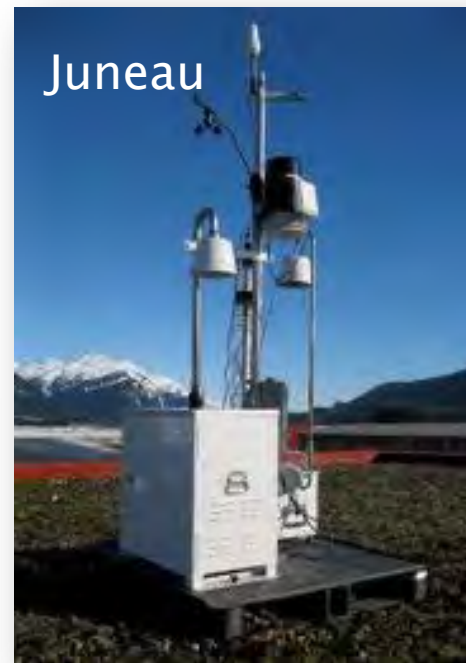
RADNET

Tracking Environmental Radiation Nationwide

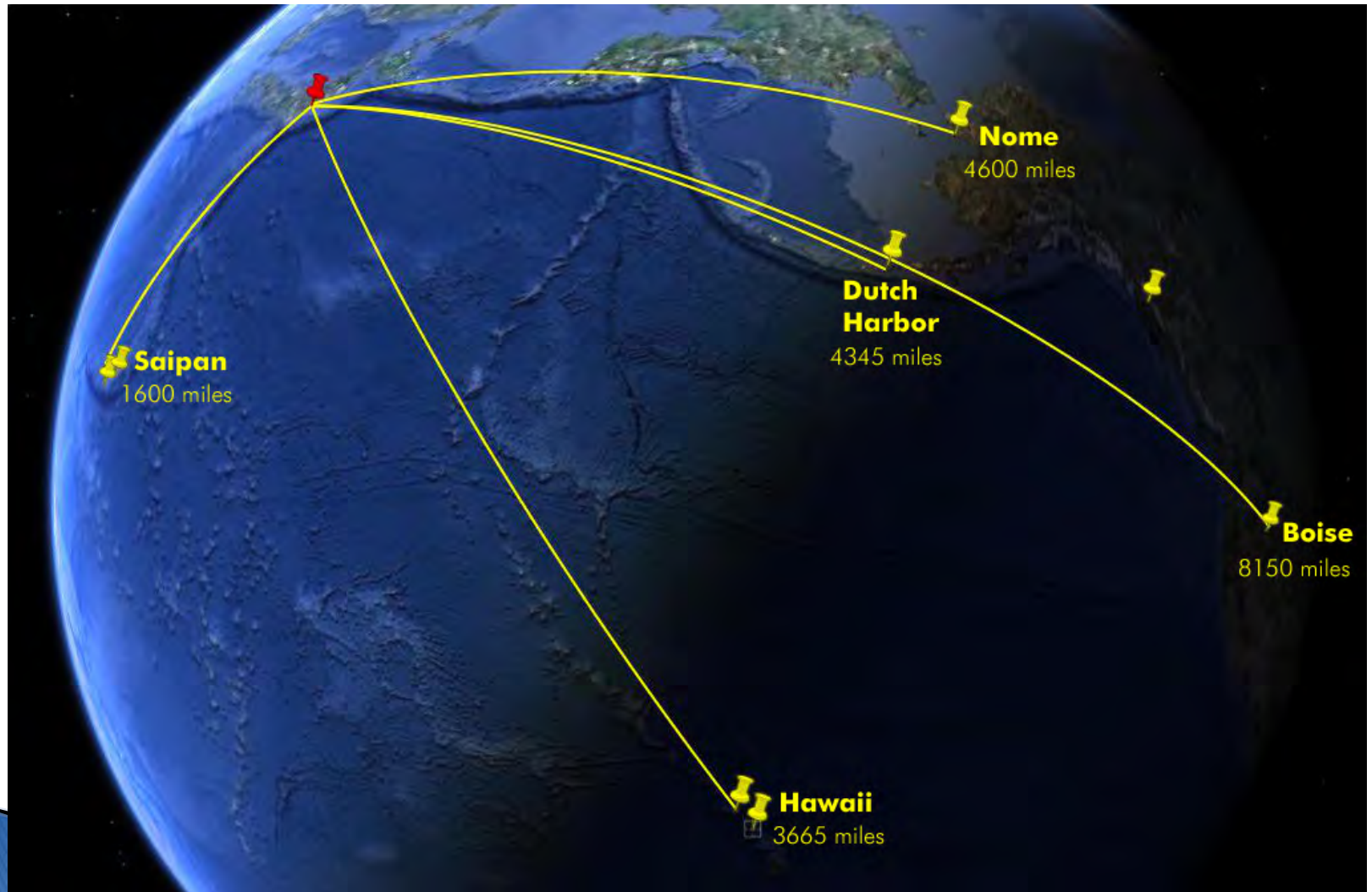
Air Monitoring Stations



RadNet Deployable Monitors: Fukushima Response



Deployable Monitors



Monitoring Results

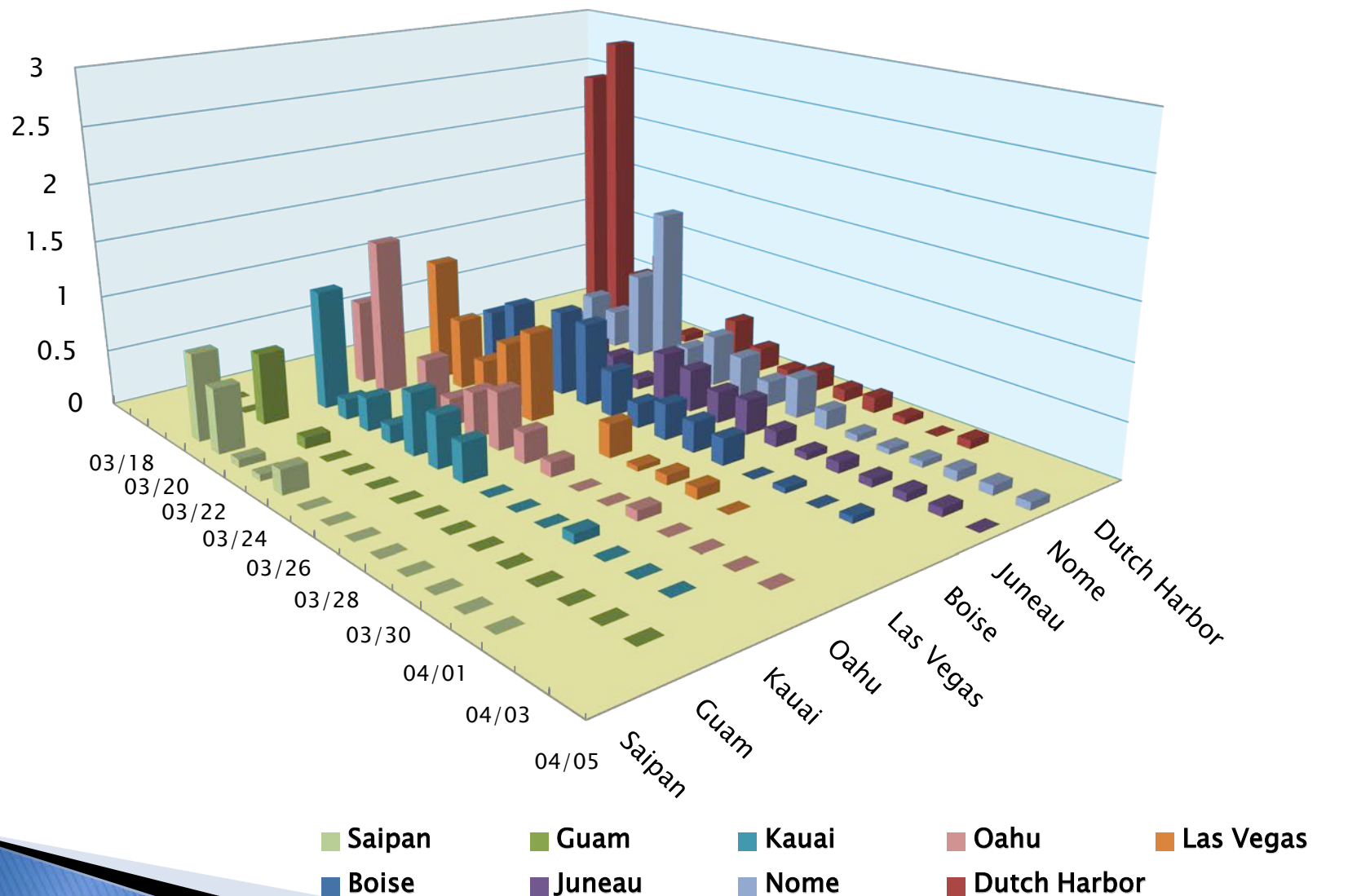
- ▶ Why focus on Iodine-131?
 - Primary Component of Fukushima release
 - Gaseous Phase
 - Transported Great Distance in Atmosphere
 - Sensitivity
 - Easily detected and measured
 - Clearly Illustrates impacts and trends
 - Primary Source of Potential Exposure

Montgomery, AL Lab Response

- ▶ The National Air & Radiation Environmental Lab (NAREL) staff has been working seven days/week to handle the different media samples (filters, rain-water, drinking water, and milk)

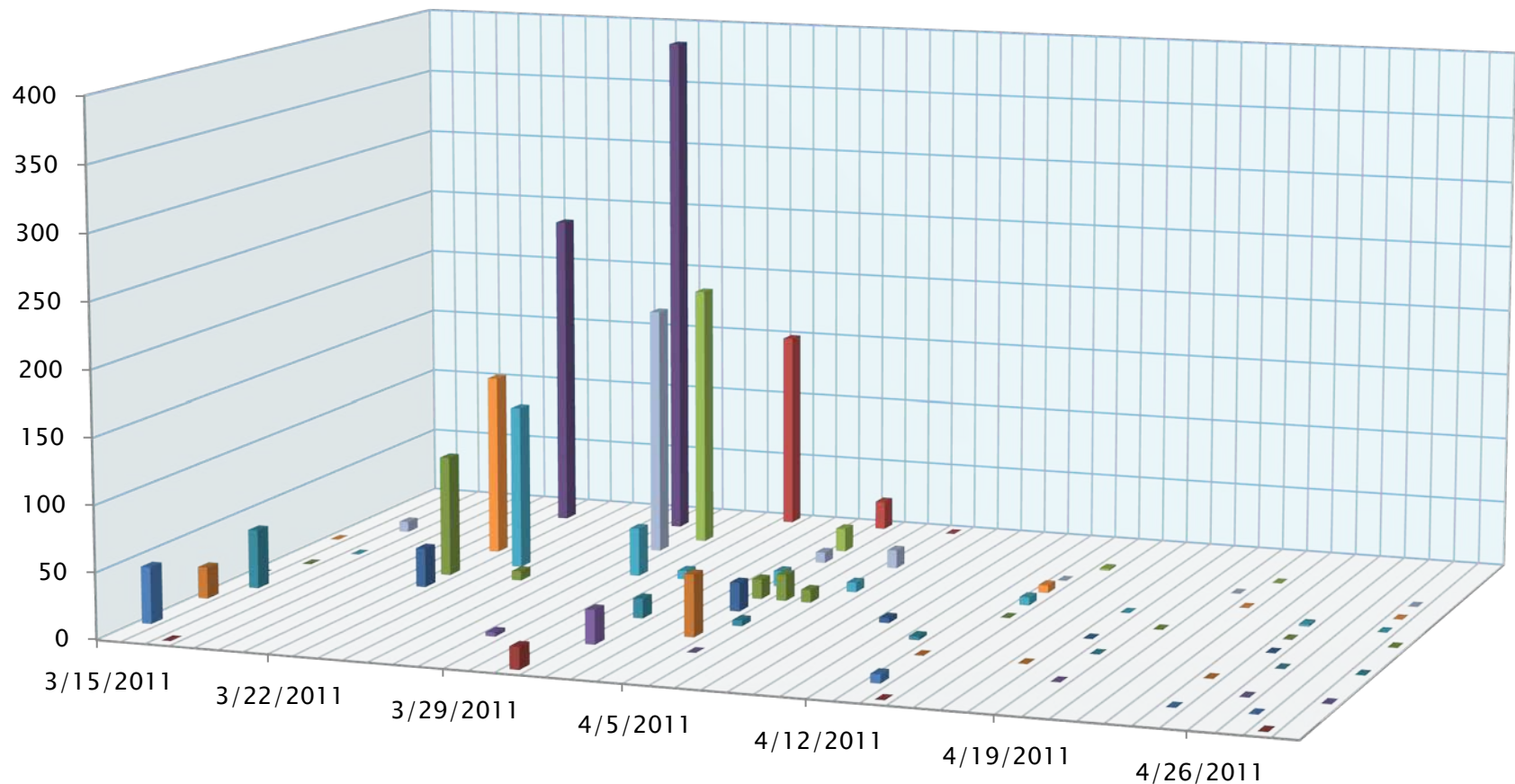


Iodine 131 – Air Cartridge Results



Maximum Concentration: 2.8 pCi/L, Dutch Harbor, 20 March 2011

Iodine 131 in Precipitation



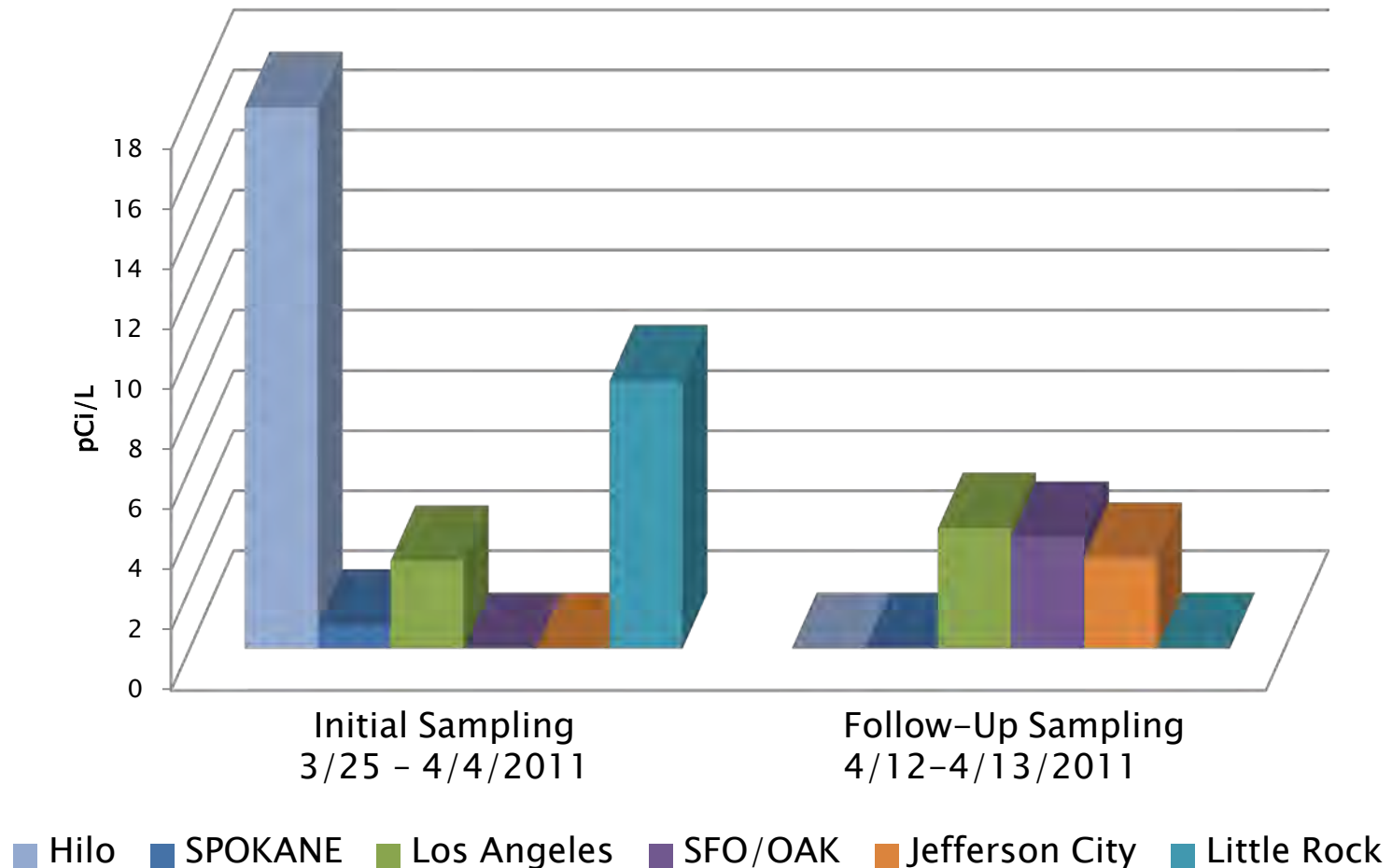
Atlanta	Denver	Knoxville	Concord	Charlotte
Albany	Boston	Olympia	Richmond, CA	Salt Lake
Kansas City	Boise	Jacksonville		

EPA's Drinking Water Maximum Contaminant Level (MCL) for Iodine-131 is 3 pCi/L.
 This Drinking Water MCL is based on long-term chronic exposures over a 70 year lifetime.

Maximum Concentration: 390 pCi/L, Boise, 27 March 2011

<http://www.epa.gov/japan2011/rert/radnet-sampling-data.html>

Iodine 131 in Milk



FDA's Derived Intervention Level (DIL) for Iodine-131 in milk is 4,770 pCi/L.



Iodine 131 in Drinking Water

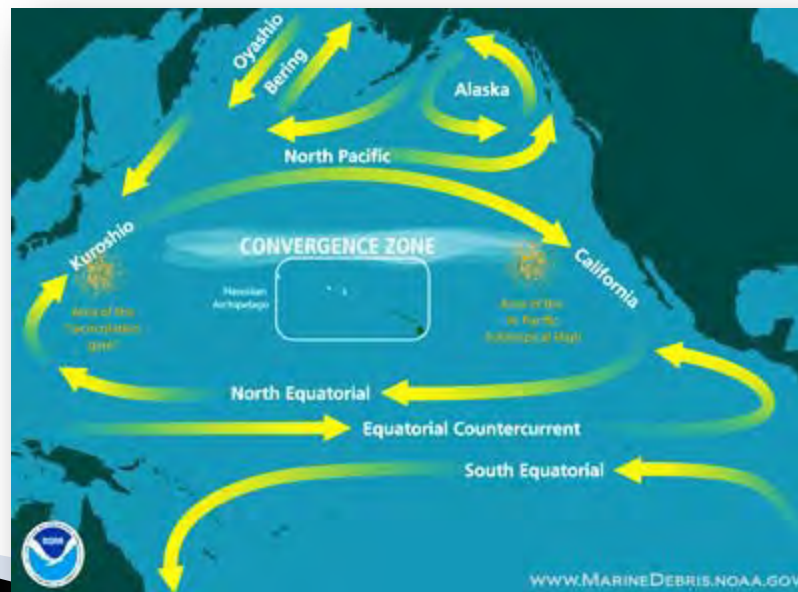
- ▶ Drinking Water levels
 - Dependent upon precipitation to surface.
 - On Surface, impacted by dilution, transport times, decay
- ▶ All “hits” in line with historical results for Drinking Water analyses

Boise Maximum Precipitation and Drinking Water Concentrations		
Precipitation	390 pCi/l	March 27
Drinking Water	0.2 pCi/L	March 28

- ▶ No Sample exceeded the Drinking Water MCL (3.0 pCi/L)

Sea Water

- ▶ Radioactive Material released to Ocean
 - Intentional release of contaminated water used for cooling*
 - Leakage from damaged reactor
- ▶ Dilution and Decay contribute to dramatic reduction of levels in Sea Water:
 - Iodine-131: 3 May – below drinking water MCL 30km offshore of Fukushima
 - 4 June – Not Detectable at Japanese offshore sampling locations
- ▶ Modeling indicates greater potential impact to US coastal areas from precipitation than from transport

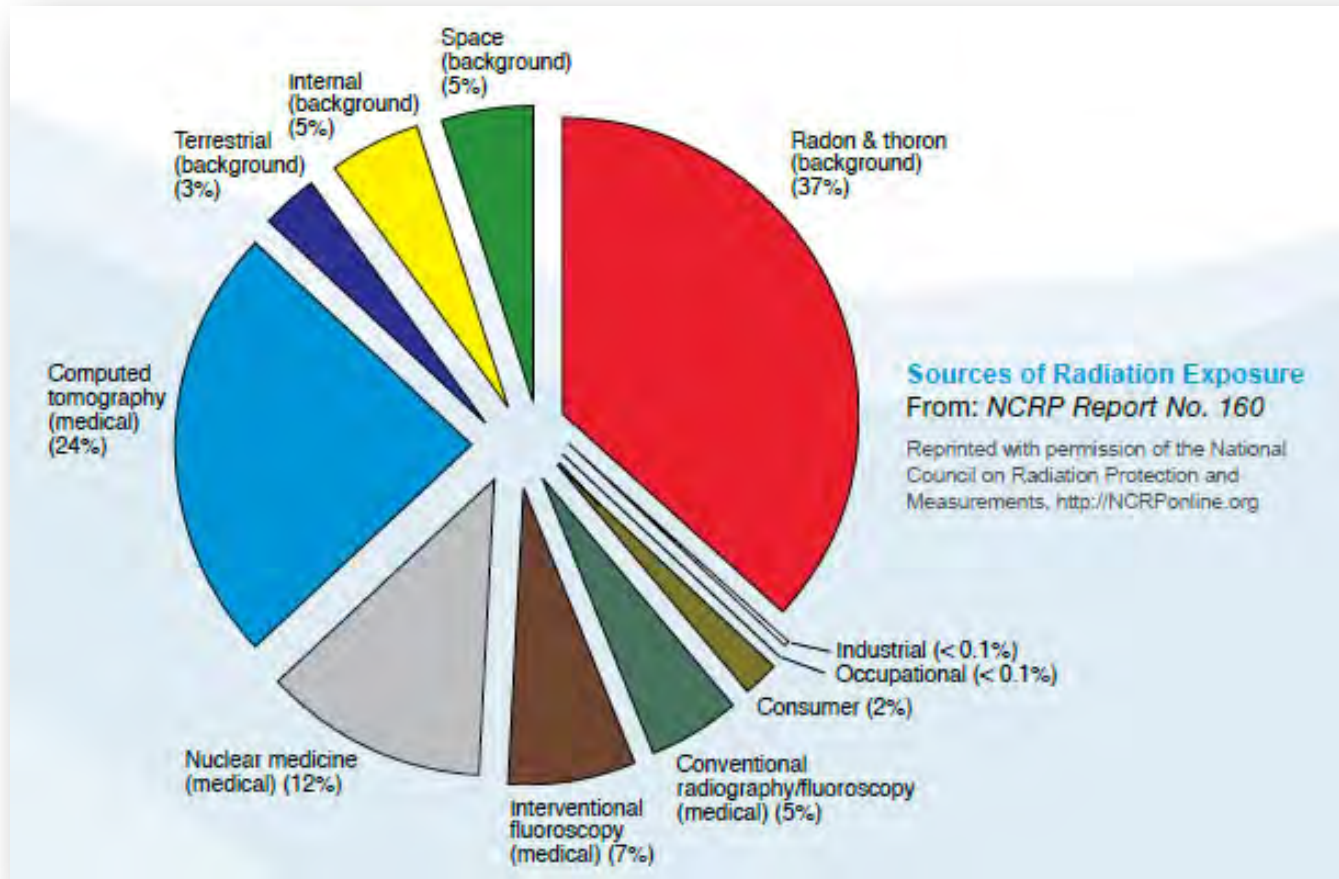


* to make space for more highly contaminated water

Seafood

- ▶ No levels above MDC seen in migratory fish species
- ▶ Japanese sand lance is only fish that exceeded radiation standards – does not migrate
- ▶ Migratory patterns of North American Pacific Salmon most commonly do not reach the coastal or offshore waters of Japan
- ▶ The majority of Alaska Salmon spend most of their ocean residence in the Gulf of Alaska
- ▶ FDA Monitoring seafood shipments to US

Putting Fukushima Risk in Perspective



Average annual radiation dose per person in the U.S. is 620 mrem

Calculate your estimated annual radiation dose:

<http://www.epa.gov/radiation/understand/calculate.html>



What is Additional Risk from Fukushima?

- ▶ Trace levels of radioactive isotopes measured are consistent with the Japanese nuclear incident and far below levels of public health concern.
 - ▶ Additional exposure from well below 1 mrem
for individuals in US and Territories
 - ▶ Measured levels hundreds to thousands of times lower than FDA Derived Intervention Levels (DILS)
 - ▶ Greater risk from Radon – 257 mrem/yr
- NCRP 160, 2009
- ▶ **Bottom line? Test your house for radon!**

One FREE Radon Home Test Kit

Radon is the leading cause of lung cancer in non-smokers.

Test your home today to find out if it has a high radon level.

The Texas Department of State Health Services, with funding through an EPA grant, offers free test kits.

Order yours at:

www.drhomeair.com *(under the State Program tab, select Texas).*

Or call 1-800-324-5928 x 84





Comparing Chernobyl Data to Current Event Data

	Highest I-131 in milk	Highest I-131 in Air	Highest I-131 in Rain
Chernobyl 1986	136 pCi/L Spokane	1.6 pCi/m ³ Boise & Phoenix	6,620 pCi/L Spokane
Japan 2011	18 pCi/L Hilo, HI	0.84 pCi/m ³ Boise	390 pCi/L Boise

Ongoing EPA Commitment

“While we do not expect radiation from the damaged Japanese reactors to reach the United States at harmful levels, I want to assure you that EPA will continue our coordination with our federal partners to monitor the air, milk, precipitation and drinking water for any changes, and we will continue our outreach to the public and the elected officials to provide information on our monitoring results.”

– Administrator Lisa P. Jackson

For more information and updates...

Calculate your estimated annual radiation dose:

<http://www.epa.gov/radiation/understand/calculate.html>

FAQs on Japan Nuclear Emergency

www.epa.gov/japan2011/japan-faqs.html

Summary of monitoring results

www.epa.gov/japan2011/rert/radnet-data-map.html

Summary of laboratory results

www.epa.gov/japan2011/rert/radnet-sampling-data.html



Thanks For Attending!

